

Radial Field Component and Alfvénic Fluctuations Observed by Ulysses During the “Fast Latitude Scan”

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As Ulysses progressed southward from the ecliptic to a maximum latitude of -80° , the radial field component was found to be independent of latitude. The possible influence of long period, solar cycle variations in B_R was ruled out by comparison with simultaneous measurements being made in the ecliptic by IMP-8. This strikingly simple result contrasted with the usual source surface models which lead to stronger fields at high latitude. However, such models ignore magnetic field stresses within the coronal region in which the solar wind originates and which tend to transport the magnetic flux to yield a uniform distribution. It now becomes important to establish whether or not the radial field component is also uniform in the northern solar hemisphere. In addition, the Ulysses observations revealed that Alfvénic fluctuations were continuously present above 50° latitude. The outward-propagating waves have important consequences for cosmic ray diffusion and for the solar wind momentum flux.

Understanding these consequences, as well as the origin of the waves, depends on establishing the properties of the fluctuations as a function of radial distance and latitude.

Fortunately, the fast latitude scan, during which the spacecraft travels from -80° to $+70^\circ$ between September 1994 and June 1995, provides an opportunity to address these important issues related to both B_R and the Alfvénic fluctuations.

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